

REMARKS

Please reconsider the application in view of the following remarks. Applicant thanks the Examiner for indicating that claims 5, 9, 10, 15-17, and 23-26 are allowed, and claims 6, 13, 14, and 20-22 contain allowable subject matter.

Disposition of Claims

Claims 1-27 are pending in this application. Claims 1, 5, 9, 15, 23, and 27 are independent. The remaining claims are, directly or indirectly, dependent on claim 1, 9, 15, or 23.

Allowable Subject Matter

Claims 6, 13, 14, and 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As discussed set forth below, the base claims 1-4, 11, 18 are believed allowable. Thus, rewriting claims 6, 13, 14, and 20-22 in independent form is deferred at this time.

Rejections under 35 U.S.C. § 103

Claims 1, 2, 11, 19, and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,740,709 to Leighton *et al.* (hereinafter “Leighton”) in view of U.S. Patent

No. 5,625,229 to Krieg *et al.* (hereinafter “Krieg”) and in further view of WO 98/55849 (“Green”). The rejection is respectfully traversed for the reasons set forth below.

One or more embodiments of the present invention are directed to a detection of gas bubbles in a water circuit for cooling an internal combustion engine of a motor vehicle (*see, Specification, page 1, lines 3-5*). Accordingly, independent claims 1 and 27 require, in part, “[a] process for detection of gas bubbles in a liquid in a water circuit for cooling an internal combustion engine.”

Additionally, in one or more embodiments in the present invention, the detection of bubbles is conducted by using a combination of a light source and a light detector, in a water circuit for cooling an internal combustion engine in which temperature, pressure, and liquid flow rates are unstably changed due to driving condition of the engine. In other words, the detection process is conducted *in situ* in a randomly fluctuating environment. In such a condition, the detection accuracy of bubbles is significantly improved if the bubbles are directly detected in the liquid without any intermediate medium such as the outer air. Thus, it is highly advantageous for a precise detection of bubbles in the liquid that the light source and the light detector are immersed in the liquid. Accordingly, independent claims 1 and 27 further require, in part, “*wherein the light source and the light detector are immersed in the liquid in the water circuit cooling the internal combustion engine.*”

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), the Examiner must show that the prior art references, when combined, teach or suggest all of the claim limitations (*see MPEP § 2143*). Applicant respectfully asserts that whether considered separately or in combination, Leighton, Krieg, and Green do not show or suggest all of the limitations of independent claims 1 and 27.

In contrast to claims 1 and 27, Green fails to show or suggest at least “*the light source and the light detector immersed in the liquid*” and “*detection for gas bubbles in the liquid in the water circuit cooling the internal combustion engine*,” as required by claims 1 and 27. The Examiner asserts, on page 10 in the Office Action, that the system disclosed in Green is structurally the same and can therefore perform all of the limitation of the claimed invention.” Applicant respectfully disagrees. As discussed above, the claimed invention includes limitations, in part, “*detection for gas bubbles in the liquid in the water circuit cooling the internal combustion engine*,” and thus, the claims are *inextricably linked to a water circuit cooling an internal combustion engine*. Instead, Green merely teaches an optical leak detector 200 for use with a cooling system exposed in extremely high temperature (typically range from approximately 1093 °C to 1482 °C), which is much higher than the pressure in a water circuit for cooling an internal combustion engine of a motor vehicle. In such an environment, immersing the light source and the light detector into the system would cause damage to the light source and the light detector. In fact, Green suggests preferably using optical fibers so as to allow a remote placement of the light source and the light detector from the system (see, for example, on page 5, paragraph starting at line 16 of the reference). In other words, Green actually teaches away from the claimed invention, in which the light source and the light detector are immersed in the liquid.

As previously argued in with the RCE filed February 26, 2007, Leighton also fails to show or suggest at least that the light source and the light detector are immersed in the water circuit cooling the internal combustion engine, as required by claims 1 and 27. In fact, Leighton merely teaches that the light source 11 and the sensor 12 are immersed in a culture liquid to calculate the cell density of microbes (*see* Leighton, column 1, lines 10-12 and 44-50).

Krieg is also completely silent with respect to wherein the light source and the light detector are immersed in the liquid of the water circuit cooling the internal combustion engine, as recited by amended independent claims 1 and 27. In fact, Krieg merely teaches the method for detecting the particles in a liquid of an infusion bottle 7 (*see* Krieg, column 5, line 34).

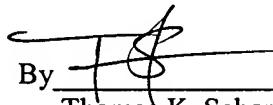
In view of the above, Leighton, Krieg, and Green taken separately or in combination, fail to show or suggest the invention as recited in independent claims 1 and 27. Green actually teaches away from the claimed invention. Thus, independent claims 1 and 27 are patentable over Leighton, Krieg, and Green for at least the reasons set forth above. Claims 2-4, 6-8, 11-14, and 18-22, directly or indirectly dependent from claim 1, are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 17198/004001).

Dated: July 17, 2007

Respectfully submitted,

By 

Thomas K. Scherer
Registration No.: 45,079
OSHA · LIANG LLP
1221 McKinney St., Suite 2800
Houston, Texas 77010
(713) 228-8600
(713) 228-8778 (Fax)
Attorney for Applicant